BLINDNESS AND THE BLIND.

BY

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(Reprinted from the JOURNAL OF THE FRANKLIN INSTITUTE, June, 1889.)

PHILADELPHIA:

1889.

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[*A lecture delivered before the* FRANKLIN INSTITUTE, *February 25, 1889.*]

THE Lecturer was introduced by Prof. EDWIN J. HOUSTON, of the INSTITUTE, and spoke as follows:

MEMBERS OF THE INSTITUTE, LADIES AND GENTLEMEN:

"The character of a man may be read in his face."* I make an addendum and say, a man's character may be read in his eye. Physiognomy is understood by all to a greater or lesser degree. The physiognomy of the eye is the more subtle science, hence requiring a more extended study.

The eye is an index to the workings of the brain: "It participates in all its emotions, expresses the most lively sensations, passions the most tumultuous, feelings the most delightful and sensations the most delicate."† One author calls it, "The tongue of the understanding."

We all feel that vision is the most valuable of the senses, for by it we enjoy the beauties of nature, it is also a source of our learning and a medium of communication. While

* Lord Kames. † Lavater.

modern methods have given the blind better advantages for knowledge, yet even the senses retained by the blind seem to be less acute to external impressions, than to those who have vision.

The most unfortunate affliction to any one, is to lose his sight. Goethe says: "To live and not see is unfortunate." Milton, the great poet, suffered with a disease of his eyes which eventually ended in blindness. At that time the nature of his malady was not understood. Science has advanced, and such cases are now successfully treated. Milton's blindness was to him a great grief. His mind was of the brightest, and most prolific in gems of noblest thoughts.

One could almost fancy that he would have lived within himself and been happy with his thoughts, but no, he says:

> "Thus with the year,
> Seasons return, but not to me returns
> Day, or the sweet approach of eve or morn,
> Or sight of vernal bloom, or summer's rose
> Or flocks or herds or human face divine:
> But clouds instead, and ever luring dark
> Surround me, from the cheerful ways of men
> Cut off, and for the book of knowledge fair
> Presented with a universal blank
> Of nature's works, to me expunged
> And wisdom at one entrance quite shut out."

In strolling through an unfrequented street of London, several years ago, I found on the shelves of an old book stall, a book which attracted my attention, the title of which was, "Blindness and the Blind." It was of more than ordinary interest to me, and from time to time I have read it with renewed interest. From its title, I have taken the subject for my lecture this evening, and as I have gained much information of interest to me from this work, I have taken the liberty of making several extracts from the same.

Probably at no time in the history of the science of medicine has there been so much attention given to the effort to prevent blindness, correcting visual defects, or

operations devised for the restoration of vision, than at the present day.

In my rambles through the picture galleries of Europe, I do not remember of ever seeing a single portrait where any defect of the eye had been noted. It would be difficult to portray a cataract, but one would expect to see an occasional crossed eye. Sometime ago I had the opportunity of becoming the owner of a few engravings of celebrated men of years ago. In this collection, I found two defects, one a crossed eye, the other, where the color of one was unlike its fellow, one being gray, the other being black or brown. I remember having once seen a negro child whose color indi cated a pure African descent, yet this child had beautiful blue eyes.

Before entering into the subject germane of my lecture, I must speak of the very great importance which light plays in the development of vision and the assistance which the eye receives from it in the performance of its functions. The immediate instrument of visual perception, light, enables us to distinguish colors, to recognize form and to measure distance. Light may be too intense, too overstimulating, when this takes place we are as liable to have blindness as in its absence.

Any theory which supposes the properties of an external world to be only those which the mind can create for itself, mistakes the question. External properties may, and do, exist without our perception of them, and any failure to perceive is not proof against an external existence. Others may, and do, see that which we, for a time, fail to see, or have not the capacity for seeing.

The overstimulating effect of light on the human eye is to be noted by the effects produced. Since the introduction of the electric light into workshops, a new disease has developed. I may state that as soon as the attention of the medical profession was called to this fact, the light was rendered less intense, and the evils caused by it have disappeared. Occasionally we still find workmen who are subjected to this torture. It is a well-known fact that men who work in furnaces or puddling mills are subject to premature cataracts.

The enthusiast, who watches a solar eclipse without protecting his vision, pays for his rashness by developing a central blind spot which may not disappear for years, or may leave him permanently blind. Dr. Whitney reported seven cases of premature injury to the vision in Japanese students from exposure to sunlight during the last eclipse. On another occasion, an engineer was rendered blind by exposure to the light of a powerful electric arc. The intense glare of the snow is also productive of blindness. It is not unusual for woodsmen or hunters to become so affected. The intense glare of the tropical seas also produces blindness, known as "moon-blindness," erroneously attributed to the effect of the rays of the moon, but in reality caused by the sun's rays.

Light is essential for the development of vision, as the retina must have a certain amount of stimulus to develop its action. In illustration of this fact we may simply refer to the blind fish of the Mammoth Cave.

Disease, in various forms, plays a part in closing blindness. At one time small-pox was a most prolific cause of loss of sight. Measles and other eruptive fevers still cause much blindness. In thickly populated countries, where about one-third of the population become affected, visual defects, in consequence, are enormously great. In hot and dry countries ophthalmia is exceedingly prevalent. Napoleon, when in Egypt, had at one time about one-fourth of his army affected. This form of disease is exceedingly contagious, and a similar form of disease finds its origin in schools and institutions where cleanliness is overlooked.

Epidemics of pink-eye still live within the recollection of many present this evening. While these diseases do not, as a rule, lead to blindness directly, yet the secondary results are baneful.

In looking over the statistics, I find that the social life of a country has much to do with the development of vision. The Germans are proverbially near-sighted. In walking through the street of any garrisoned city of the German Empire, one is struck by the number of officers wearing glasses. The English, as a nation, are far-sighted. In our

own country we find the same law holding good. The community, descendants of English, retain this primal defect of their ancestors. The German community the same. Where there has been a commingling, the prepotency of the stronger is shown, and the "American eye" is the result. By this I mean the astigmatic eye. Astigmatism may be either of that kind known as far-sighted or near-sighted, or a mixture of both.

A very interesting examination of Indian school children was made by myself some years ago. Those just from their Western homes, or those who had been in school but a very short time, I found had exceedingly good vision, above the average of the American boy or girl. When I came to examine the boys and girls of the Creek tribe, here I found that civilization had placed her hand upon them. Near-sighted ones were common. This tribe, let it be remembered, have been more or less civilized for fifty years.

To prove still farther that class application, and especially the amount of study now required by teachers and possibly by directors of our public schools, is making the younger generation a generation of myopes or near-sighted individuals, let me quote from Dr. Cohn, who examined 10,000 school children, 17·1 per cent. or more than one-sixth of whom were near-sighted. No village children were found to be short-sighted until they had been at least half a year at school. Dr. Derby, of Boston, found the same defect co-existing to a greater or less degree with the time students had spent at Yale. My friend, Dr. Risley, of this city, some years ago, made a careful examination of the eyes of children attending the public schools. He found many defects. Beer, the famous ophthalmic surgeon, seventy years ago wrote against forcing school children. He said: "I have done much to impress upon parents and friends, in the most friendly manner and upon the most convincing grounds, the mischievous effects upon the eyes of growing children of the forcing system of the present day in schools." Note the result. Anyone who has travelled through Germany or Austria is struck by the number of

individuals wearing glasses. Three generations have passed away since Beer wrote the above sentences, but his prophecy has born its fruit. The Germans are to-day a near-sighted race.

Workmen on fine work always complain of defective vision. So common are these troubles that physicians have long ago ceased to give such diseases technical names, but such names as illustrate the occupation of the individual.

The ancients knew that the glare from white hot metals would cause blindness in a very few moments, and was a frequent means of punishment for their criminals or prisoners of war. It was supposed that Samson was in this way blinded by the Philistines. Nebuchadnezzar blinded Zedekiah by this means. Levy tells us that Pope Paschal, in 824, put out the eyes of every monk who preached fidelity to the Emperor of Germany. In 873, Charles the Bald, King of France, put out the eyes of one of his sons, who, having been made a monk against his will, had escaped and set his father at defiance. In 1004, the King of Poland conquered Bohemia and destroyed the vision of its duke. These horrors are surpassed by the fiendish conduct of the Emperor of Basilus, who, having in 1013 defeated the Bulgarians, put out the eyes of his prisoners, 15,000 in number, leaving only one person in a hundred with one eye to guide the sightless beings to their homes. Even in England, blinding prisoners of war or state was a common mode of punishment. It is said that Ivan the terrible, Czar of Muscovy, after the completion of the cathedral in Moscow, had the eyes of the architect put out, lest he should ever construct another building equal to it in beauty.

As I stated previously, ophthalmia was a prolific source of blindness. It is said that in the twelfth century the streets of English towns were beset by Crusaders who had returned from the Holy Land, where they had lost their vision from this disease. In France, the attention of good King Louis IX was called to the large number of these blind individuals wandering about the streets of Paris, and in 1260, founded an institution for their reception, where, to this day, the good work then done is shown in the magnificent

institution, where the blind from all parts of France are admitted. I visited this institution recently, which is now the oldest institution for the blind in Europe. At this time I take the opportunity of mentioning, and with just pride, that among the many charitable institutions of Philadelphia, none rank higher in their record of good work than the Institution for the Blind, at Twentieth and Race Streets.

There is one kind of blindness, I am sorry to say, for which the American Continent may be held responsible. While many cases do not exist, yet they are to be found. I believe, however, that it is a more frequent source of injury to vision than we like to admit. I refer to the abuse of tobacco. Tobacco abuse, while it may lead to absolute blindness, first may weaken the muscles of accommodation, thereby causing no end of visual difficulties, but also producing loss of power in recognizing colors or color-blindness, a defect which, when existing among engine drivers, may peril the lives of many people entrusted to their care. At the last meeting of the British Medical Association, held in Glasgow, Dr. Bickerton, of Liverpool, read a paper on "Sailors and their Eyesight," including color-blindness. He is persuaded that many accidents at sea, both collisions and strandings, are caused by defective eyesight. To begin with color-blindness, Dr. Bickerton gives two cases in which accidents have been proved to have been directly due to this cause. Both accidents happened in our own country. The first is a collision which took place, in 1875, near Norfolk, Va., between the steam tug *Lumberman* and the steamer *Isaac Bell*. The master of the former vessel asserted that before the collision he saw the latter's red or port light, and manœuvred his own ship accordingly. All the other evidence proved beyond a doubt, that only the green or starboard light of the *Isaac Bell* could have been visible to the *Lumberman*. The master's mistake, through which ten lives were lost, remained inexplicable until a surgical examination, four years later, proved him to be color-blind. These facts are attested by the Annual Report for 1880 of the United States Inspector General of Steam Vessels. The second case is given on the authority of the

Shipping and Mercantile Gazette and Lloyd's List. It is there stated that the steamer *City of Austria* was lost in the harbor of Fernandina, Florida, in April, 1881, owing to the defective eyesight of the pilot, who was unable to distinguish the colors of the buoys. Dr. Bickerton, in addition, mentions the collision which took place last January between the *Toronto* and the *Freidis*, in St. George's Channel. In that case, according to the evidence given at the Board of Trade inquiry, the lookout man saw, before the collision, only a green light; while the captain, mate and quartermaster saw first a red and then a green one. The man denied that he was color-blind, but, as Dr. Bickerton stated, it was in the last degree unlikely that he would admit such a defect. The last instance given is the too notorious collision between the *Vanguard* and the *Iron Duke*, in 1875. That collision was due to the fact that the *Iron Duke* steered out of line just when the *Vanguard* was slackening her speed, and this reduction of speed, without which the collision would not have taken place, was due to the report of the lookout man that a ship was crossing the bows of the iron-clad. Nobody else saw this ship, though four other men were on the lookout, and the man who reported her admitted afterwards that his eyesight was defective and that he had been twice treated for blindness of the right eye. The facts of this case are given on the authority of the official reports of the court martial; and here, at any rate, it seems clearly established that defective eyesight was a contributing cause of a most disastrous collision. On board the ships of our Trans-Atlantic lines, we believe, the utmost care is taken in the selection of men for the responsible post of lookout. As Lord Brassey, speaking of the *Vanguard* case, said, in the House of Commons: "The entire management and manœuvring of a ship by the officers in command may depend on the experience and judgment of the men on the lookout aloft, and if they are not efficient, the gravest consequences may ensue." It therefore becomes evident that as long as signals at sea are given by colored lights, color-blindness is a fatal defect in a lookout man, and as the side lights, which every vessel carries to indicate her position

and course, are red and green — the two colors most commonly confused—the defect, when it exists, is particularly apt to lead to disastrous results. In fact, the authorities have recognized the force of these *à priori* considerations by making it compulsory upon all persons presenting themselves for officers' certificates to submit to a color examination. In our country, the subject of color-blindness has received much attention, and we may all feel sure that our engine drivers are men who can distinguish the difference in shade between a bright scarlet or a green light. When we know that forty men out of every thousand have this defect to a greater or less degree, we see the importance of having such men undergo an examination. It would be to the advantage of all boys to undergo such an examination once in their school life. Where the defect exists, let them know it, and their life work be so arranged for them that at some epoch in their lives they may not find themselves disqualified for following an occupation selected for them. A color-blind would be useless where the selection of color entered into his life work. Color-blinds make the best etchers, steel engravers, or wood engravers, for they possess what is known to their profession as the "recognition of tone." The man having normal color-sense depends on shade. But two women in one thousand are color-blind. The savage races possess the perception of color to a greater degree than the civilized races. In an experience of ten years I have found only one individual who was totally color-blind. Those blind to red and green, as I stated previously, are common. The usual tests for color-blindness are the matching of wools. Not the naming of colors, as names vary, and what might be called light green, might in some other language be called a light blue, and the individual who makes the assertion be perfectly correct. A person might in this way be put down as a color-blind, when it was simply a case of mistaken nomenclature.

A color-blind engineer on a clear night could not very easily make a mistake in recognizing his danger signal, for he will long before have learned that the light from the red light is not as clear as that from a white or even so much as

from a green. This is the reason why it is found that color-blind engineers have escaped accidents. I can recall an incident of this kind. A number of color-blinds were tested in the ordinary way, by red and green lights. It was soon found that two out of three men recognized the colors correctly. Our tests were carried on in the open air on a dark, but clear night, with the stars shining bright. It puzzled us very much. Suspecting that the men had certain information which they were using, they were taken into a building and submitted to the same tests, with a result which proved them to be color-blind. They then confessed that they had used a bright shining star as their guide. The light from the green light approached the light emitted from the star, yet when the red light was turned on, the light was not nearly so bright as the white or green light. One of the simpler ways of testing for this defect, is by placing before the candidate a large collection of wools, including all the chief colors and several shades of each. Prof. Holmgren's test is to choose a rose color. The candidate will then be asked to match it. If his perception is good he will promptly select the rose wools, if he is red-blind he will select the light blue or violets, if green blind, the light grays or drabs. Rose being compounded of two parts red and one of blue, he would therefore select a blue, to match, as he would think, a blue. The second test would be a more pronounced one. We would then give him a scarlet. To this a red blind would match a dark brown, or a dark green. A green blind would match a light brown and a light green. Dr. B. Joy Jeffries, of Boston, was a pioneer investigator in this country. It has been suggested that this sense should be developed by training or practice. This is simply impossible. Color-blindness may be the result of disease, brain disturbance, or congenital. One of the most brilliant teachers of Moorsfield Eye Hospital, London, recently went blind from an affection of the optic nerve. The first symptom of failing vision was his loss of color perception.

It is not infrequent to find individuals who work on colored goods, to find certain colors more fatiguing to their

eyes than others. Physicians now recognize a disease known as "weavers' disease." The red colors, which have the longest wave length, exhaust the eye first, the green follows second in order, while the blue is soothing. All are familiar with the phenomena produced by gazing steadily at a red disk or red letters, under bright illumination. Suddenly turning our eyes against a white background, we will soon recognize the same spot or the letters in the same color, which will, in a very short time, be replaced by the complementary color, green. This is due to retinal exhaustion, which for the time is unable to perceive the red element, but sees only the bluish-green produced by the admixture of the still visible green and violet.

Color in medicine may some day play a *rôle*. Psychophysics is a subject which the Germans are now discussing. Dr. Brodham, who has recently been making experiments for the purpose of testing the fundamental law of psychophysics in connection with the sense of sight, says: "If it can become known certainly that the perception of color has a distinct and important influence upon the arrangement and interaction of the brain cells upon each other, we shall be able to drop the use of drugs to a great extent, and get our curing as we get our ailments, largely through the eye." This quotation has more pith in it than we should at first surmise. Recently I had an individual tell me that the color yellow would produce a nausea, and even an exceedingly bright day would bring about the same affection. A pair of Arundel-tinted glasses gave relief.

Do the blind enjoy the sense of sight in their dreams? This subject has lately been under discussion, and Professor Jastrow, who has personally examined 200 cases, has gathered some very interesting data. Of fifty-eight cases, which he quotes specially, thirty-two became blind before completing their fifth year, and not one of these thirty-two see in their dreams. Six became blind between their fifth and seventh years. Of these four have dreams of seeing, but two of them seldom, and with some vagueness, while two never dream of seeing at all. Of twenty persons who became blind after their seventh year, all have dream vision. Dr.

Jastrow remarks that "the period of dream vision is from the fifth to the seventh year. If blindness occurs between the fifth and seventh years the preservation of the visualizing power depends on the degree of development of the individual. If the faculty is retained, it is neither staple nor pronounced. If sight is lost after the seventh year, the sight centre can, in spite of the loss, maintain its functions, and the dreams of such individuals are hardly distinguishable from those of a seeing person. Dr. Jastrow brings out the very interesting fact that the chief sense with the totally blind is hearing, and not the sense of touch. Dr. Hermann, in 1858, wrote a very interesting article on this subject. I quote from Dr. Jastrow's paper: "Dr. Hermann records the answers of fourteen totally blind persons who lost their sight previous to their fifth year, and none of them had dream vision. Of four who lost their sight between the fifth and seventh year, one had dream vision, one has it dim and rare, and two do not definitely know. Of thirty-five, who became blind after their seventh year, all have dream vision. Dr. Hermann includes in his list many aged persons, and from their answers is able to conclude that, generally speaking, those who become blind in mature life retain the power of vision longer than those who become blind nearer the critical age of five to seven years. He records twelve cases whose dream vision continues after the blindness of fifteen years, four of from fifteen to twenty years, four from twenty to twenty-five, and one of thirty-five years. In one case dream vision was maintained for fifty-two years, and in another fifty-four years, but these faded out."

I have for more than a year past given much attention to this subject. Those who have been blind from birth, or early childhood, do not enjoy sight in their dreams. For two reasons, first, they, like the rest of humanity, picture in dreams what they are accustomed to do in their day life, and as they do not depend upon sight in the performance of their daily duties, it does not form any part of their dreams. Second, it is impossible for the blind to get a correct definition of sight, how then can the imagination form a picture when the

material with which it is to work does not come under its sway? The pictures formed by the blind in their dreams are as the arch without the keystone; the mass is confused, and the absence of sight, which is the keystone to the mental arch, prevents the dream from being complete. I have talked with those who have lost their sight in later life, and their dreams are similar to those of persons who see. That is to say, if an individual lost his sight to-day he would continue to see forms, but as time rolled on the mental picture would gradually grow fainter and fainter, so that one who had been blind for a certain number of years would never again see form. Those blind from infancy would in their dreams depend upon the sense of touch and hearing, as these are the means by which those who have been deprived of sight are made acquainted with what goes on about them. When such individuals dream, they seem to talk with those who have a part in their dream, and can distinguish their voices as they reply to questions. They may fancy that they see daylight, but such persons always experience a greater sense of loneliness than is actually felt by the blind, when compelled to rely on their own responsibility at such times. A blind person once told me that she dreamed of a human face. It seemed as if she wanted to become acquainted with its shape. She placed her hand over it, and found its shape to be what is termed oval. The expression was absent, but to this blind person the face seemed to lack nothing, for how would it be possible to miss that which she had never seen? One cannot picture the beautiful city of Paris as it really is without visiting it, and can the blind picture that which description fails to make clear?

In some instances, color may be distinguished by persons who have but slight perception of light. In one individual who was thus affected, the two most prominent colors were red and blue; pink and yellow were seen but very indistinctly, the reason being that she had difficulty in distinguishing them at all times, while, on the contrary, red and blue are more readily distinguished. Colors seldom appeared in her dreams, and, when they did, had a faded look. Light

is invariably seen in this patient's dreams. It is clear and silvery. Prof. Helmholtz recently called attention to the sensation of light which we have all noticed in the dark, and when the retina is at rest. This sensation he calls "Eigenlicht," a name which brings us back to the curious belief of the Greeks, and which is said to have been shared in by Descartes, that the eye has a light of its own which it sheds on the outer world.

Another person writes me: "Ocular vision, to a person blind from the time his memory begins, is a far greater stranger than is a view of heaven to the sighted person. The sighted person is able to form some idea of heaven by seeing some beautiful garden and letting his heated imagination play among the beauties and charms there. What has the person always blind to build upon in order to form an idea bearing even the slightest resemblance to ocular vision? When we take sufficient pains, we are able to trace in our dreams the cause to which each particular feature owes its origin. The causes are clear or dim, or almost unrecognizable, just according to the force of the impression upon the mind during wakefulness. Hence, a dream is an after-view of what we experience. How, then, is it possible for a person always blind to dream of seeing?" Several such persons, in answer to my questions, have declared that they have seen in their dreams. However, they failed to draw distinct features of it. Their picture was no picture —a mass void of shape and color. They threw the marble, stone and other materials in a heap, and said: "There's the mansion." I am led to believe that their answer was prompted by a certain unaccountable false shame of theirs in confessing their inability to see in their dreams. Several persons blind from birth, not merely intelligent, but intellectual ones, have told me that they could see in their dreams.

In reference to those who have seen, a young man writes me, "I lost my sight at the age of fifteen. In some of my dreams I see just as I had seen in my former life, partake of the same pleasures, such as reading, skating, base ball, swimming, etc.; and in other dreams I see everything, but

am almost helpless. In travelling the streets, for instance, I use my cane instead of my eyes, and on reading I must hold my book close to my eyes, and, as it were, strain my sight, and often the print seems blurred. I often remember what I have read. (I have also composed a stanza of poetry in my dreams, and recited it after waking.)"

Another, who has been totally blind, not even having light perception, writes as follows: "Many persons are of the opinion that the blind can, and do see in their dreams. That during slumber, their eyes as it were are opened and they perceive the rays of light and objects at a distance which are veiled from them during their waking hours. This erroneous idea is due partly to a want of proper consideration of the subject, and partly, perhaps, to the fact that there are some blind persons who say that they dream of seeing. It is strange how many fallacious ideas there are regarding the blind." There are some blind persons, who, in order to make themselves appear wonderful, often go beyond the bounds of truth, and their statements are too apt to be accepted as facts by the sighted, without considering whether they are true or false. As, for instance, the false notion that the blind can tell color by the sense of smell, or a dollar bill by the sense of touch. "The phenomenon of dreaming is the same with the blind as with the seeing. It is now generally believed that our dreams are the result of some past association. I believe that all of our dreams may be accounted for in this manner. Some of them appear strange and curious, but it is because we can no longer recall the association or impression, but that impression was once made upon the mind. If this is so, how can the person who has never enjoyed the sense of sight dream of seeing? What conception can a man blind from birth have of a ray of light, of color, or of objects seen at a distance? He might study the subject of the eye for a lifetime but his conception of it would be very obscure. He might learn from physics how images of objects are formed upon the retina, but no amount of study can tell him how an image looked to the eye. How is it possible for him to dream of seeing if he had no concep-

tion whatever of sight? It is the same as if you were to expect a person deaf from infancy to dream of music."

Far-sightedness, or hypermetropia. The length of the eyeball plays an important factor in seeing at a distance. When the eyeball is too short to allow the rays of light to fall upon the retina, we have indistinct objects formed on the back of the eye. In hypermetropia the muscle known as the ciliary muscle, compensates in a measure, by allowing the lens to become more convex, which renders the distant object more clear. In youth this function is very pronounced. It recedes as age advances. As we approach middle life it is lost. For this reason one is obliged to use glasses when the forty-fifth milestone is passed. Frequently individuals with very good vision are obliged to wear glasses at forty. When such is the case that man or woman is far-sighted. Race peculiarities, shape of the head has much to do with this form of vision. The Anglo-Saxon races and savage races are far-sighted. Helmbold speaks of the exceedingly acute vision of the Indians of South America. My own examinations among Indians of our own country confirm this. As long as an individual has an out-door occupation, this sort of vision plays very little importance in the life work of the person. But when such a person has an in-door occupation, then do a multitude of troubles arise. Among the first to show themselves, is headache. This trouble may take on the most aggravated form, as nausea, pain in and about the eyes, a tired and languid feeling. So well known are these symptoms that an ophthalmic surgeon at once recognizes the trouble, even the family physician, whose advice is frequently sought, at once advises the wearing of glasses properly adjusted. Many individuals after a visit to the opera or an art gallery will return home with a severe headache, and to this form has been affixed the name of "sight-seers" headache. The American who goes "globe-trotting" flies to Paris, visits the numerous picture-galleries, exhibitions, etc., or, as one tourist told me, visits forty-two cities in thirty-two days, and doing all the things set down in the guide book. Let that man be possessed of the least

degree of hyperopia, and he pays for his enterprise by having headache after headache. A pair of glasses would have saved him much misery. Fatigue is also responsible for an important share in its production. The ever changing of the eye whose focus of vision shifts at every turn requires a double effort to give clear vision.

The second condition of defective vision and that which Americans should be careful to guard against, and yet are almost criminal in neglecting, is *myopia*, or *near-sightedness*. Civilization seems to be responsible for this increasing malady. Let any number of savages be tested for distant vision and mark the result – perfect vision. Transfer your examinations among the highest class of intelligence, or the book-worms and note the change—near-sightedness. Sift the statistics of Cohn, Risley and Darby. They tell us that myopia is rapidly on the increase among school-children. This means that as generation follows generation visual defects will also multiply. When Dr. Cohn, of Breslau, examined the eyes of 10,000 children, 1,000 were near-sighted. He found also, what was more important, that the number increased, as he ascended the schools from the primary to the higher classes. Bad light, badly constructed desks, both agencies being alike in causing children to stoop over their work. Then again, ten hours a day is much too long for a growing boy or girl to be harnessed to such close work. A director in one of the public schools recently brought his daughter to me to be examined for defective vision. I found that the child had so many lessons to write and commit to memory that she had two sets of books, one set remaining at home, the second set at school. The aggregate number of books were so many that she was unable to carry them. When school directors permit such a state of affairs, nature must succumb under the strain. Extreme cases of near-sightedness are always in danger of becoming blind by excessive eye strain: the inner coats of the eye separating and floating about in the vitreous fluids. Parents and teachers have a great responsibility resting upon them. They should see that children have proper glasses and should never allow them to assume

cramped positions, as stooping forward fills the blood vessels, and long continuance of this brings about changes which are hurtful to vision. Reading by moonlight, or defective artificial light, or in railway cars, is also a great source of evil. The pleasure a near-sighted person first experiences when using the proper glasses, is beyond description. I remember an instance of a general, who, during our late civil war, acquired a reputation for bravery in the field of battle far beyond what he deserved, as he expressed it years afterwards when he had his near-sightedness corrected by glasses. He found that his bravery was due to defective vision, not being able to see danger. Myopia was the making of his reputation, although many lives were lost, for no doubt he frequently led his men into danger, where, had he had good vision, he would never have ventured.

Having now explained the condition of visual defects brought about by either too short or too long measurements of the eyeball, I must dwell briefly on that condition of the eye where but one meridian is affected. It seems that this affection is more pronounced in the American type than in other nationalities. Not that it does not exist abroad, but our oculists probably are keener in its detection. I mean astigmatism. This defect may be far-sightedness or near-sightedness, or a combination of both. It comes from an eye whose focusing power is less in one meridian than in the other, or the curvature of the cornea is different in the two meridians. It is probably the source of more headaches than all the other visual defects combined. In looking at a card upon which radiating lines diverge from a point, its first and most obvious effect is to produce differences. Some may be perfectly clear and those at right angles blurred. In reading or drawing, one suffering with such a defect soon exhausts his vision.

Dr. R. B. Carter relates an anecdote of a gentleman suffering from astigmatism, or from what the patient described as "periodical obscuration of vision." Dr. Carter found that the gentleman sat in an office which commanded a view of a large clock dial on the other side of a quadrangle. When the hands of the clock were approximately

vertical, he would see them plainly, but when they were approximately horizontal he could scarcely see them at all. The patient naturally thought he was a "curious physiological phenomenon." Glasses corrected the defect. Many students of Hebrew labor under this gentleman's mistake, the Hebrew characters being more pronounced in their horizontal lines. A clergyman once came under my notice who could not see lines running in a horizontal meridian. He was obliged to give up the study of Hebrew while a student at college. I have often been struck by the thought that probably the astigmatic eye might be held responsible for the peculiar formation of the letters of the different alphabets. If we examine the Hebrew type we find the horizontal lines much broader, while the German type is broader in the vertical. The Roman and Greek alphabets must have been invented by individuals with almost perfect vision, for these letters are the same in their different meridians.

Policemen and candidates for the fire department are subjected to a thorough physical examination at the hands of police surgeon Dr. T. H. Andrews. It falls to my province to examine them for defective vision and color-blindness. The examination of at lest one thousand men show the defects of vision and lack of color sense to be exceedingly high. It is with pride that I can record the unwritten history of the good and efficient work done in this matter by our city officials. Men who readily pass an examination by daylight, might still have a defect which would render them incapable of doing duty at night. I may mention the case of one man, who held an appointment of trust, whose vision was good for his daily duties, but as soon as the twilight came on was so blind that he became helpless. This disease extended to sixteen members of his family, the result of a consanguineous marriage. How could such a man detect a burglar or the beginning of a fire in which hundreds of thousands of dollars might be lost? We now know the importance of having our "guardians of the night" equipped with perfect vision. This defect of night blindness, or nyctalopia, shows itself in two ways,

first by dimness of vision at night, and second by contraction of the field of vision, *i. e.*, an object which could be seen in the normal eye at the extreme right or left, the eye looking forward, would have to be brought to the front, approaching the middle line. A patient once graphically expressed the condition by saying that her eyes seemed to be gradually growing smaller.

Cataract is less clearly understood by the laity than almost any of the common affections of the eye. One invariably hears it described by individuals as a skin covering the sight. As the human being advances in years, we find the tissues contain less fluid, that the finger-nails, cartilages and bones become more mineralized, and so with the crystalline lens of the eye; it also takes upon itself a change. This change assumes a hardening and a consequent loss of transparency. As the lens is placed directly over the visual line, sufficient light cannot pass through the pupil, and the result is blindness. A certain amount is able to pass through an opaque lens. The light from a candle may be readily distinguished. When this is not so we find that the other parts of the eye have lost their functions, and in such a case it would be useless to remove a cataract. The oncoming of age is not always responsible for the development of cataract. Some are congenital, others the result of the abuse of health, and again traumatism enters largely into their development. Men who are engaged in furnaces, watching the molten metal and not protecting their vision with proper glasses, are extremely liable to early cataract. As to the exact cause of senile cataract we are still in doubt. Why one man at forty should have a thoroughly ripe cataract, and another man at seventy should escape, pathology leaves us in doubt. The predisposition to cataract before the age of forty is small, after this period relatively common. The habits of a people have much to do with its development. In countries where much cheap wine is drank cataracts are common. Professor Mooren, of Düsseldorf, once said to me that we, in the United States, would never have a large number of cataracts until our people drank more wine. Opium smok-

ing is said to produce cataracts. It is a well-known fact that cataracts are common among the Turks. Statistics fail to give us any information in regard to the Mongolians. Children are born with them, but fortunately nature takes a little compassion on her unfortunates, and instead of causing the whole lens to become opaque, the nucleus is the part affected. When dilating an iris which covers such a lens, a certain amount of vision is gained, but the peripheral part of the retina is only stimulated and vision is very imperfect. In such cases we have a constant rolling of the eyeballs, as if the person were constantly trying to get better vision. I have at present under my care a young woman who had this congenital defect. A needle operation was performed, the cataract was totally absorbed, but, contrary to my expectations, she still uses the peripheral part of her retina to see objects, the macula, or that part of the normal eye which is the sensitive part, being disregarded. Five years ago, at the Germantown Hospital, I had brought to my attention a case of congenital cataract, in a colored woman about sixty years of age. This woman had been blind from birth. She was able to see light but not form. After the successful removal of a cataract from one eye and the bandages were removed, for the first time in her life she looked upon the earth. She was quite nervous, and was afraid to walk. She was not able to measure distance, and would reach after objects a long way off. After assuring her that she could walk, she was led to the window to look upon the trees and the outer world. A flock of sparrows excited her very much, and when told that they were birds would not believe it. In walking she had no conception of distance, and would walk against objects in her way. Bright colors pleased her. When she wished to know the name of anything, she closed her eyes and felt the object with her hands. She was then able to tell what it was. About a year afterwards I removed the second cataract, which was also successful, and to-day she is still in the hospital as an employé, and is able to perform her duties as a general servant. It is not my purpose to enter into a detailed account of the various operations devised for the

removal of an opaque crystalline lens. That would be a subject which would probably interest medical students or members of the profession only. History has noted the fact that the ancient Egyptians recognized this form of blindness and performed an operation. Celsus described and practiced the needle operation, which operation was the only one performed for nearly 1,700 years. Daviel, a French surgeon, devised the corneal incision about the beginning of the eighteenth century, although it seems probable that the Arabians were acquainted with this method long before. As ophthalmic science advanced, various forms of operations were suggested and carried out. Fashions, in operations, run in grooves, just as we see it on the fashion plates. A particularly dexterous surgeon will find that he is successful in one kind of operation. He may have a large following of students, these students will imitate their teacher, and so it is that certain operations are introduced and become popular. To-day the ophthalmic surgeon has again attempted the operation without removing a part of the iris. This operation will in time be superseded by another, as time rolls on. Since the discovery of cocaine, much dread of the removal of cataracts has been taken away. This drug, which was discovered partly by accident, has been one of the best adjuncts to ophthalmic science.

The eye is an index to health. Note the change upon that man or woman who has lost much sleep either by press of work, disease, or mental worriment. There you will always see the opaque, glassy eye, lacking expression, showing more than in any other way that nature is exhausted. To the trained and observing physician the eye is an index to the seriousness of a malady more potent than the pulse or respiration. Since the introduction of the ophthalmoscope many diseases of the nervous system, of the circulation, and brain, are detected in their incipiency. By the examination of the background of an eye, at times with an equal degree of certainty the expert can prognosticate the lease of life. Watch the change in that individual who seeks early repose, takes plenty of out-door exercise, is guarded in his diet, spurns alcohol, tobacco, and other

stimulants. Let the face be ever so inattractive that eye, with its marvellous clearness, will attract our attention. Who has ever seen an intelligent man or woman with an eye that did not reflect the polish of the brain? Take the wretch, hardened to all the finer feelings which might once have existed in his organization, long steeped in crime and infamy. Note the difference. When such dull eyes of intensely passionate natures are looked at, you see the "eyes of born devils in human shape." The man whose brain has been ravished by disease and has become insane has the wild weird look that only a Poe could describe. There are some individuals, when under excitement, whose eyes reflect the activity of their brain like a "flash of light on a rocky coast." It is said that the eyes of Gladstone, when in the midst of a grand oration, will assume a most unnatural brilliancy, light will almost flash from them. Rossi and Irving seem to have stored away in their eyes electrodes, which emit sparks of light when overcharged with nervous excitement.

One is frequently asked, which eye is the stronger, the gray or the black? You might ask with an equal degree of propriety, which class of individuals are the longer lived, the blonde or the brunette. Color does not seem to enter into the strength of the eye. Nature in her wisdom had to guard the delicate organization of the eye by throwing around it a coat of pigment which absorbed an excess of light, hence it is that the race of people living in the torrid zone are dark eyed and dark-skinned, while those living in the temperate zones, or where the rays of light are not so intense, have less pigment.

As I stated in the early part of my lecture, it is the abuse of the sense of sight which leads to weakness. This law holds good to the gray or black eye. In speaking of the beauty of eyes, a recent writer's views are as follows: "The most beautiful eyes in the world are the clear gray, with large pupils, and iris which changes and darkens with feeling as from the shadow of a cloud. The steadiness, brilliance and susceptibility of such eyes are an index to the rarest intelligence, quick and acute, and the high

romantic sentiments in which some characters become passions. Truth, liberality, loyalty, are the vital breath of such spirits, but, alas, those eyes are not of the long-lived. Dust is over them before we can say we have known them for our own."

The eye as an index to character has been described by Paracelsus, in 1616, in the following words: "To come to the practical part and give proper signs, with some of their significations, it is to be remarked that blackness in the eye denotes health, a firm mind, not wavering and fearful, but courageous, true and honorable. Gray eyes generally denote deceit, instability and indecision. Short sight denotes an able projector, crafty and intriguing in action. A squinting or false sight, which sees on both sides, or over and under, certainly denotes a deceitful crafty person, not easily deceived, mistrustful, and not always to be trusted; one who avoids labor when he can, willingly indulges in idleness, plays usury and pilfering. Small, deep-sunken eyes, are bold in opposition, not discouraged, intriguing and active in wickedness, capable of suffering much. Large eyes denotes a covetous, greedy man, especially when prominent. Eyes in continual motion signify short or weak sight, fear and care. The winking eye denotes a loving disposition, foresight, quickness in projecting. The downcast eye shows shame and modesty. Bright eyes, slow of motion, speak the hero, great acts, one who is daring and feared by his enemies, yet cheerful and sociable."

The best preservative to eyesight is out-door exercise. Watch the lustre of the eyes of that young man or woman who has just had a gallop through the Park, or who has had an hour at lawn tennis. A cold bath every morning stimulates the circulation, and with an active bounding of the blood through the arteries assimilation and elimination bring about good results. Heated rooms, with poor illumination, is a very prolific source of weak eyes. Reading or writing with the light falling on the page and reflecting its rays into the eyes often brings about a spasm of the little muscles which govern the accommodation and the

result is to exhaust the eyes. The light should always come from behind the individual and fall obliquely over the left shoulder. People who indulge in over-feeding, are careless about clothing, travel with damp feet, or dine irregularly, all suffer sooner or later from defective vision. A habit quite common among fashionable ladies, to whom nature has denied a black or brown eye, is to seek the secrets of the chemists shop and apply a weak solution of belladonna or homatropine to dilate the pupil and render the cornea more brilliant. Even the cologne bottle has been drained of its contents to give brilliancy to the eyes. Such habits are only to be spoken of to be condemned. Let the natural lubricant be the only cosmetic used. See that the tears are kept healthy by proper means and nature will then do her duty. Another source of injury to the eyesight is the indiscriminate use of glasses. Scarcely a day passes but the ophthalmic surgeon must pass judgment on from one to half-a-dozen pair of glasses which are shown him by his patients who have been allured to the shops of the enterprising opticians by the deceiving advertisement, "Eyes examined free," as if sight could be measured, as the cloth merchant deals with his goods—by the yard. The druggist who dispenses his drugs must be a qualified man. Is it less important that the man who deals with the most important sense should be less so? As the druggist is not a physician, so should the optician not pretend, by his practice, to be an oculist. I am sure that the note-book of every oculist is filled with cases showing where irreparable injury has been done by glasses improperly adjusted. I remember the case of a little girl who for several years was obliged by an over-zealous mother to wear glasses which were given her by an itinerant peddler for near-sightedness, when upon examination the child was found to be far-sighted. Many elderly people make a very grave mistake in submitting the care of their eyes to the same class of individuals.

When glasses must be changed more than once a year and the wearer is more than fifty years of age, there must be something wrong with the functions of the eye, and

while it may be only a signal of danger, yet that person should seek advice through the proper source. If ophthalmology is a science, then the making and prescribing of glasses are as different as the mixing and prescribing of drugs. We have before our Legislature a bill for the higher education of medical students. What a benefit would be conferred upon the community at large if a clause were added to that bill making it a misdemeanor to sell glasses without a prescription. The adjustment of glasses is a science as much dependent upon a scientific knowledge of the eye as the prescribing of drugs for symptoms which may be the forerunner of a serious malady. Within the last week I had to inform a young woman that she was hopelessly blind and that treatment would be of no avail. She had an affection of the optic nerve which, when it first made its appearance, caused dimness of vision. Thinking that a pair of glasses would remedy her failing sight, she sought aid at the hands of an optician who examined eyes free. She bought four pairs of glasses in as many months, receiving the assurance that it was only stronger glasses that she required. The law permits such wrongs, but the life of that young woman is condemned to utter darkness while life remains. In justice to some of our leading opticians I must say that they are exceedingly careful to whom and for what purpose they sell their wares. They may lose the sale of a dozen pairs of glasses, but what is that to the consciousness of knowing that they do not steal away the vision of individuals who, from their indigent circumstances, are the most to excite our sympathies. The Americans use their eyes as they do their brains and bodies. They condense as much labor into two-score years as they should into three score and ten. Watch that boy going to school with a pack of books, whose weight has curved his spine before he has arrived at his fifteenth mile-stone. His eyes at this period of his life are overstrained, the result is, glasses must be brought into use to support a weakened condition of the muscles of accommodation. He grows into manhood weakened physically. Many men and women abuse the gifts given them by a prudent ancestry, by read-

ing through a forty-column newspaper on a jolting railway train, or in a poorly-lighted street car, changing the focusing power with every foot of ground travelled. Our American journals, not content with giving a man a fair amount of reading for six days, double the dose on Sundays. The over-worked business man needs as much rest for his eyes and brain, as the overworked laboring man for his muscles. The latter will prudently observe this one day. The business man must have his newspaper which, with its thirty pages of printed matter, must be read. Thus from Monday morning till Monday following his eyes and brain are kept constantly employed. This high pressure is going to show its effects sooner or later. Were it not for the new blood brought into our country by the peasants of Europe, which prevents our race from degenerating, I would not like to answer the questions as to what would become of us as a race in a few generations. Education must be given to children, the fine arts cultivated, business must go on, but let us halt and think. We owe something to posterity. The greatest inheritance a child can have is a good physique, which also means good health. The care of the eyes in childhood is of the greatest importance. They are more sensitive to light then than in adult life. A mother or nurse will frequently expose the eyes of an infant to the glare of the sun for hours at a time. One can surmise the evil which will be the outgrowth of such carelessness. The greater number of the blind lose their sight from carelessness during infancy. When one visits a blind asylum and sees the number of children who could have been saved from their deplorable condition, one grows heartsick. Parents must remember that, as the child advances in years, a difference may exist in its eyes. As the child is father to the man, so do oculists know that the eyes in childhood are subject to as much variation in their power of seeing as in adult life. The eyeball of one child may be normal, in another either too short or too long. A variation from the normal means eye strain.

It has been found that near-sightedness largely exceeds far-sightedness of children in cities. We speak against the

early instruction of children. Seven to nine years of age is soon enough for children to begin their studies. By this time nature has acquired a certain development which can resist to some extent the amount of labor put upon an eye. Children should have good light during their study hours, and should not be allowed to study much by artificial light before the age of ten. Books printed in small type should never be allowed in school-rooms, much less be read by insufficient light. The selection of occupation for children should not be neglected. Examination for color-blindness should be gone into, visual defects searched out. How very unfortunate it would be for a boy who had given a certain amount of his student life to the study of an occupation which he could not follow. A boy might be able to see the time on the steeple of a tower half a mile away, yet not be able to follow a line in drawing for five minutes. An out-of-doors occupation in such a case might make him a successful man, while he would fail as an architect, no matter what his ability as an artist might be.

The eyes of the adult may suffer from any cause. Overwork, with insufficient light, is a prolific cause of trouble. Dr. Carter tells us that natural light is as necessary to the eye as food to the stomach. At one time it was the fashion to have houses made as gloomy as dark paper on the walls could make rooms. Dark blinds, guarded by shutters painted in some dark color. When people so housed come forth into the natural light they remind one of a squinting race. All of this was a prolific source of eye trouble.

Writers on hygiene have the satisfaction of knowing that their condemnation is producing different effects in home decoration.

To those who are familiar with Beethoven's beautiful, and world famous "Moonlight Sonata," it must be a pleasure to know that it was inspired by a blind girl. The story is told by a friend of his, who accompanied him one evening on a walk through a narrow street in Bonn. While they were passing the door of a cobbler's shop, Beethoven suddenly stopped, and as his ear detected the sound of music said, "Hark, what sound is that? It is from my sonata in

F. How well it is played." They entered the room and found seated at the piano a blind girl, her brother near by repairing shoes. "Pardon me," said Beethoven, "but I heard music and was tempted to enter. I am a musician. I overheard something of what you said. You wish to hear some good—that is—shall I play for you?" There was something so odd in the whole affair, and something so comical in the manner of the speaker, that the spell was broken in a moment, and all smiled involuntarily. "Thank you," said the shoemaker; "but our piano is so wretched, and we have no music." "No music," echoed my friend; "how, then, does the young lady—" He paused and colored, for as he looked in the girl's eyes he saw that she was blind. "I, I entreat your pardon," he stammered; "I had not perceived before. Then you play by ear?" "Yes," said the girl; "we lived at Bruhl for two years, and while there I used to hear a lady practicing near us. During the summer evenings the windows were open, and I walked to and fro outside to listen to her." She seemed so shy that Beethoven said no more to her, but seated himself quietly at the piano and began to play. He no sooner struck the first chord than I knew what would follow, how grand he would be that night. And I was not mistaken. Never during all the years I knew him did I hear him play as he played to that blind girl and her brother. He seemed to be inspired; and, from the instant when his fingers began to wander along the keys, the very tone of the instrument seemed to grow sweeter and more equal. The brother and sister were silent with wonder and rapture. The former laid aside his work; the latter, with her head bent slightly forward, and her hands pressed lightly over her breast, crouched down near the piano, as if fearful lest the beating of her heart should break the flow of those magical, sweet sounds. It was as if we were all bound in a strange dream, and only feared to wake. Suddenly the flame of the single candle wavered, sank, and went out. Beethoven paused, and I threw open the shutters, admitting a flood of brilliant moonlight. The room was almost as light as before, the moon's rays falling straight upon the piano and player. But the chain of his ideas

seemed to have been broken by the accident. His head dropped upon his breast; his hands rested upon his knees; he seemed almost absorbed in thought. He remained thus for sometime. At length the young shoemaker rose and approached him eagerly, yet reverently. "Wonderful man," he said in a low tone; "who and what are you?" "Listen," said Beethoven, and he then played the opening bars of the Sonata in F. A cry of delight and recognition burst from them both, and they exclaimed, "Then you are Beethoven!" They covered his hands with tears and kisses. He rose to go, but they held him back with entreaties. "Play to us once more, only once more." He suffered himself to be led back to the piano. The moon shone brightly through the window and lighted up the glorious rugged head and massive figure. "I will improvise a sonata to the moonlight," he said, looking up thoughtfully to the sky and stars. Then his hands dropped upon the keys and he began playing a sad and infinitely lovely movement, which crept gently over the instrument like the calm flow of moonlight over the dark earth. This was followed by a wild, elfin passage in triple time—a sort of grotesque interlude, like the dance of spirits upon the lawn. Then came a swift *agitato finale*—a breathless, hurrying, trembling movement, descriptive of flight, and uncertainty, and vague impulsive terror, which carried us away on its rustling wings, and left us all in emotion and wonder. "Farewell to you," said Beethoven, pushing back his chair and turning toward the door—"farewell to you."